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ABSTRACT

This paper reviews the components of three critical dimensions that must be considered during the implementation of distance learning processes: essential conditions, educational consensus about teaching and learning, and telecommunications technology capacity. These dimensions lay the foundation that affects future decisions about school budgeting, resource allocation, teaching and learning, certification, and professional development. Implications for professional development are explored in depth. The phases for infusion of new tools and ideas into staff development are discussed; a table presents a matrix that includes aspects of instructional strategies, learning tasks, assessment, and student and teacher roles during the different phases (i.e., entry/adoption, adaptation, integration/collaborative expansion, invention) of technology development within a learning environment. Features common to staff development strategies that encompass collaborative reflective inquiry are described, and suggestions for successful implementation of distance education are included. (AEF)

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Setting the Stage for Dynamic Use of Distance Learning Technologies in Education

By Ellen Miyasato*

As Pacific communities plan for a Pacific-wide telecommunications infrastructure in the near future, islanders will have the opportunity to re-conceptualize the learning environment for students, teachers, and adults. They must grapple with many questions about how technology can be effectively integrated into education: What kinds of telecommunications opportunities will impact learning? What types of distance-learning media and services will best provide these opportunities for learners? What infrastructure design will work best for the delivery of these services? The way these questions are addressed by the learning community—telecommunication agencies, government, higher education, central office leaders, teachers, community liaisons, and partnering agencies—will determine the impact that distance learning will have on teaching and learning in the Pacific region.

This paper reviews the components of three critical dimensions that must be considered during the implementation of distance-learning processes: essential conditions, educational consensus about teaching and learning, and telecommunications technological capacity. These dimensions lay the foundation that affects future decisions about school budgeting, resource allocation, teaching and learning, certification, and professional development. Implications for professional development are explored in depth.

What Is Distance Learning?

Distance learning is simply learning that takes place over a distance through the use of telecommunications technologies such as satellites, telephones, computers, and cable-television systems. Distance-learning technology enhances a student's capacity to engage in learning that he/she selects, at any time, in a variety of modes, and with experts both within and beyond the classroom. Typically, satellite-transmitted instructional programs are viewed on cable television with capability for learners to interact with the instructor by telephone, the Internet, or FAX. Instructional programs and resources can also be delivered through the Internet. Distance learning helps learners meet their educational needs by overcoming barriers of distance and time, by providing remote communities with

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access to resources, and by actively engaging learners in the learning process (Steiner, 1995). The concept of distance learning is continually evolving and expanding as new technologies are developed and integrated into the wide spectrum of existing ones. Distance learning for the Pacific learner could translate into:

- Greater access to learning resources for students, teachers, and adults
- More opportunities for collaborative learning among peers, mentors, colleagues, and instructors around the world
- Alternative higher education opportunities for credit, certification, and professional development
- Sharing of Pacific cultures and electronic products with global audiences

To support these opportunities, telecommunication tools can support a variety of teaching and learning applications. These generally fall into four basic instructional uses: retrieval of resources, communication, publication/production of new knowledge, and integration of evolving technologies for the management of teaching and learning. Table 1 provides examples of applications supported by telecommunications tools.

Table 1. *Uses of Distance-Learning Technology*

1. **Tools for retrieving information** (Harris, 1998)

   Computer—Information exchange about cultural traditions, environmental issues, promising practices; expert consultation online and tele-fieldtrips in which learners are not only consumers but also information providers; web access to digital libraries of information, photos, documents, and databases; common documents, such as collected stories, that are published electronically; news analyses in electronic magazines

   Video—Informational, satellite-delivered programming; images in the form of slides, films, or videotapes

   Audio—Radio access to information and stories

2. **Tools for communication**

   Computer—E-mail exchange involving interaction between students, teachers, adults, and experts in a global learning environment; newsgroups, forums, and Internet bulletin boards where common topics of interest are explored; distance mentoring in which universities, businesses, and schools provide online services in the form of mentoring and integrated-learning packages and courses; real-time, text-based, and desktop video conference interactions

   Video—Live, interactive video and video conferencing opportunities between two or multiple sites provided by real-time video capability combined with audio tools

Continued on next page

Table 1. — *Continued*

Audio—Interactive technologies using the telephone, audio conferencing, and radio waves

Print—Print is still considered a viable distance tool for study guides, course syllabi, case studies, support text, and so on

3. **Tools for electronic/multimedia production and presentation**—Image/sound capturing, editing, and production devices for video and CD; mixed media presentations for web publication

4. **Integrated mixture of tools that support instructional management**—Online management of resources, assessment, profiles, and databases

In a typical distance-education scenario, a variety of mixed media is commonly used. It might include a print component in the form of course text, readings, schedules, or syllabi accessed through the Internet. Two-way interactive audio and/or video can provide real-time face-to-face and voice-to-voice interaction. Live audio/video media can incorporate guest speakers, mentors, and content experts who would otherwise not have the opportunity to be in class. Communication among teachers, mentors, and peers can be accomplished through computer conferencing, electronic mail, and online forums. Pre-recorded videotapes can be used for class presentations. Distribution of assignments and announcements can also be transmitted via fax. Collaborative problem solving among global partners that culminates in a mutually developed project can be conducted using current information telecommunications media.

For the Pacific learner, distance education can provide opportunities for greater equity and access to many learning opportunities that are not available without a telecommunications infrastructure. Effective distance learning, however, begins with careful planning.

The Three Dimensions of Implementation

The extent to which a learning community can effectively combine three critical dimensions when implementing distance-learning technology will determine the degree of its effectiveness and its impact on learning. These three critical dimensions are: (1) agreement about essential conditions and appropriate context, (2) educational consensus about teaching and learning, and (3) planning for effective implementation of advanced telecommunications technologies (Sheingold, 1990). Each agenda by itself presents powerful possibilities for educational impact. However, none is likely to realize its full potential in the absence of the other two.

Over the years, educators have met the needs of learners by integrating a current trend, such as telecommunications technology, simply by channeling it within the educational system itself. Today, schools cannot limit themselves to any single intervention model. Merely introducing electronic tools into classrooms while leaving the basic design of teaching and learning unaltered offers little hope that the desired major impact on learning will occur.

1) Essential Conditions

Current literature indicates that the following conditions are essential for developing an appropriate context for telecommunications technology (Dede, 1998). These factors reflect physical, organizational, human, financial, and policy decisions that affect implementation.

- Develop vision, policies, and standards that support technology-intensive learning environments (ISTE, 1998) including proactive leadership and support for the application of telecommunications technology.

- Advocate student-centered approaches to learning that are supported by current research on learning, and ensure student access to current technologies, software, and telecommunications networks.

- Define standards and assessment procedures for effective application of technology in order to promote learning.

- Develop a community-based approach that includes partners who provide expertise, support, and real-life interaction (institutions of higher education, telecommunication and cable agencies, businesses, government sectors, and others).

- Address ethical, legal, and standards issues in the use of telecommunications technology.

- Apply a systemic and evolutionary approach to the implementation of telecommunications technology.

- Provide ongoing financial help, technical assistance, professional development applications, and other resources to support sustained technology use.

2) Educational Consensus About Teaching and Learning

Efforts to affect student learning and achievement in the Pacific reflect common shifts in teaching and learning approaches. The following characteristics have implications for learning that takes place in an intensive telecommunications technology learning environment:

- Past/Present/Future Focus: Students can appreciate their ability to construct and shape the future; educators have the opportunity to foster the belief that we shape the future through present actions, while recognizing values and traditions in our past that should be perpetuated.

- Global Perspective: As learners participate in complex, global, multilingual, and multicultural environments made possible through communications media, the development of human values and concerns will be impacted by communication skills and the capacity to engage in collaborative learning situations.

- From Information to Knowledge: In our information-rich environment, learners need to apply complex and high-order cognitive skills in order to critically select and process vast resources of information into meaningful knowledge. At the current rate at which information is becoming obsolete, education can no longer be limited to the early years of life.

- Connected Learning: Education advocates a holistic and inquiry approach to learning that is centered on students becoming engaged in processing ideas, universal themes, or problems that are inter-disciplinary. Becoming aware of one's own cognitive processes is necessary, as learners are required to apply diverse approaches to learning and problem solving.

- Authentic Learning: Community-based learning that tackles real problems provides a meaningful and relevant context for student learning.

- Successful Learning: Standards-based learning is a leverage that will allow all learners to succeed in learning.

3) Telecommunications Technological Capacity

It has been recognized that telecommunications technology can serve as a tool to support, enhance, and extend learning through challenging, real-life tasks. To this end, the following indicators reflect characteristics of technologies that support meaningful learning experiences (Illinois State Board of Education, 1997).

- All members of the learning community are able to access rich resources within and beyond the school and to use, interact, and exchange data in different formats and programs.

- The technological design applies standards of inter-operability and user-friendliness to promote engaged learning.

- The instructional design allows students to engage in collaborative projects and create products that present new knowledge or tools.

Convergence of the Three Dimensions

The agreement that evolves from the convergence of these three dimensions will serve as a foundation for integrating and implementing distance-learning technologies in schools. The essential conditions provide expectations for well-supported and self-sustaining innovation; high standards for student achievement define the purposes and direction for the new technologies; and the technological capacity supports the design of teaching and learning and serves as a catalyst for the design of new learning opportunities.

It is important to recognize that policy structures, cultural orientations, and expectations about teaching and learning vary from place to place in the Pacific. Adapting elements of the three dimensions allows a customized foundation that reflects local ideals, values, and cultural priorities. The modified foundation that is developed will affect decisions in other areas such as infrastructure design, technology planning, budgeting, allocation of resources, and professional development. Professional development, in particular, will have a direct impact on teachers and students when distance-learning technologies are infused into the educational structure.

Implications for Staff Development

Research by Everett Rogers (1997), an expert on the processes of adopting communications innovations, confirms observations about effective staff development over the past decade: The focus of staff development should not be on the role of technology in the learning environment (beyond initial awareness of its potential) but rather on creating a learning environment that fosters sustainable growth and focuses on students, the curriculum, and learning. Hagel and Armstrong (1997) emphasize that integrating new technologies into the present ways of teaching and learning can be a recipe

for failure. A careful balancing act between satisfying current needs and envisioning future promising practices is critical for building capacity. Incorporating new strategies and tools into new models of teaching and learning requires teachers to function as "instructional designers" rather than mere "lesson planners," and to create "customized" rather than "adapted" telecommunications applications.

Research indicates that, for change that is systemic and sustainable, staff development opportunities must reflect the following elements:

- Involvement of key stakeholders in developing an organizational strategic plan.
- Involvement of school teams—grade-level groups, departments, multidisciplinary teams, school improvement teams, online colleagues, and mentors—in collegial and collaborative inquiry.
- Engagement of colleagues in learning that is based on a balance of research and experience; participants work with real students in authentic situations.
- A constructivist (learner-centered) environment where participants can explore and construct their own knowledge about instruction using technology and can transfer new ideas into their individual classrooms.
- Immediate and continuing feedback about the implementation of technology in order to encourage reflection and ongoing conversation about instructional change.

Phases for Infusion of New Tools and Ideas

Designing a staff development program that incorporates all essential conditions and results in sustainable benefits for teachers and students requires an implementation strategy that includes what is known about how educators adopt new ideas. In "Site-based Accountability for Instructional Technology Purchases," Moersch (1996) identifies the phases for infusion of new learning ideas, from "entry" to "adoption." The phases are not steps to follow; they are information to consider when staff development models are developed. By determining phases of adoption and availability of emerging telecommunications technologies, a cost-effective implementation strategy that reduces the time required for adoption can be developed. Apple Classrooms of Tomorrow (Apple, 1998) and the TEAMS Distance Learning Project (Lane, 1995) have adapted this concept during two years of program evaluation.

Table 2 shows a matrix that includes aspects of instructional strategies, learning tasks, assessment, and student and teacher roles during different phases of technology development within a learning environment. It shows both interventions that are possible using basic technology tools and interventions that utilize telecommunications technology. The matrix can be enhanced or adapted to include attributes of effective teaching and learning that are valued by the community of learners for which it is intended (Serim & Koch, 1996).

Table 2 *Phases of Infusion for Telecommunications Technology in a Learning Environment*

	Entry / Adoption	Adaptation	Integration / Collaborative Expansion	Invention
Basic Technology	• Develop shared vision for learning • Develop baseline training for teachers • Infuse critical mass of learners • Share experiences with non-users	• Train educators about the use of new tools and the range of media attributes and applications • Provide inservice to discuss alternative pedagogies based on research • Provide inservice on "tool" software such as publication, authoring, and hypermedia programs to enhance current curricula areas	• Diversify staff development to support on-site, in-class, and online assistance • Provide opportunities to solve problems through integrated, multi-discipline approaches, infusing mixed media tools when appropriate	• Write and publish experiences • Mentor others in the local community as well as online • Create new models for teaching and learning
Telecommunications Technology	• Build awareness of information technologies and potential applications	• Conduct observations of promising practices models (video, online, peer) • Utilize distance-learning programs as supplements to courses of study • Adapt technology and telecommunications media to current/existing instructional program in the form of "activities" • Engage in interpersonal distance-learning communication for information collection • Develop ethics component to distance learning • Produce and publish products utilizing software • Participate in global learning networks	• Use new information telecommunication tools regularly • Include technical support for designing instructional applications using the new distance-learning tools • Select from a variety of teaching structures (e.g., direct instruction, inquiry, discussion, cooperative learning) dependent on student needs • Develop technology applications in a learning context • Extend collegial learning to a global learning environment (online conferences, online peers, researchers, mentors) • Engage students in "peer feedback" with online instructors and peers • Apply integrated approaches and tools • Involve students in collaborative global problem-solving projects	• Use telecommunications regularly as a means for students and teachers to keep in contact with global innovators • Produce distance learning programs • Produce products for outside audiences • Apply inquiry and research as a process to create new knowledge and tools • Create new learning environments for teaching and learning; contribute to the Internet culture and in the creation of distance-learning programming • Initiate, manage, and maintain collaborative projects

The capacity to effectively create desired learning environments and capitalize on information technologies will vary with level of skill (among teachers, schools, and districts) and according to available technologies. Using this matrix, an individual, school, or district can determine a profile of current practices to serve as the starting point for a staff development program. Using this approach, staff can develop a systematic professional development program that emphasizes development of instructional designs by teachers in order to promote effective teaching and learning experiences.

Collaborative Inquiry

Common to all promising staff development strategies are features that encompass collaborative reflective inquiry. These features, supported by current literature and studies, center on effective ways to improve education by implementing individual, school, district, and state practices that support integrated distance-learning technologies. Richard Sagor (1992), who compared learning among professional groups and conducted research on the cultures of "effective schools," found that a cultural norm emphasizing collegiality and teacher research is an essential ingredient in the work culture of an effective school.

Collaborative reflective inquiry enables teachers to improve the teaching-learning process while also contributing to their own professional development. It is not a new process, and variations can be found in much staff development literature. The following features are usually embedded in the process.

1. *Identification of an issue, question, area of interest, or need*
   Examine current teaching practices, and identify issues and areas of interest that are currently of greatest professional concern. For example, a need might focus on critical elements of instruction that will successfully infuse information technologies to impact student learning.

2. *Reconnaissance, observation, and data collection*
   Collect compelling information from a variety of existing sources: student work and portfolios; tools for capturing everyday life such as logs, journals, photographs, videos, checklists, and rating scales; and tools for questioning such as interviews, surveys, and tests. This is an appropriate time to use information technology in the learning process in order to gather data. A variety of professional development listservs and web-based data sources have been developed so that teachers can discuss concerns and retrieve information on common educational issues.

3. *Trends, patterns, and other evidence*
   The soul of the collaborative inquiry process is identifying emerging patterns, trends, and other evidence about how integration affects student learning, and comparing that evidence to current instructional practices. Some examples of how the integrated distance-learning technologies can support collaborative learning for teachers include promising practices modeled by other distance-learning programs, online observations of student projects, and collegial dialogue with mentors in the field and other educators who are currently working with similar issues.

4. *Revised plan of action*
   A plan of action that specifies desired professional practices is collectively developed using information learned from observation, research, and examination of one's own teaching.

5. *Sharing*
   Finding forums to share discoveries has been rewarding for many teams. Venues include district meetings, conferences, journals, and faculty meetings. Being a guest speaker on a television program, setting up a webpage, and posting information on teacher listservs are ways to integrate information technologies.

6. *Reflecting*
   This process develops through reflection on research, adapted instructional practices, results, and new knowledge created. Judi Harris, who draws on extensive experience and research into distance-learning instructional strategies, indicates that the implementation of distance-education technologies cannot be modeled solely on educational activities that involve more traditional media (Harris, 1998). Collaborative inquiry allows for the development of new instructional procedures rather than reliance on the general curriculum or existing lesson plans. It results in long-term adoption of telecommunications tools for teaching and learning.

Suggestions for Successful Implementation of Distance Education

Although technology plays a key role in the delivery of distance education, research has overwhelmingly shown that educators must remain focused on learner outcomes and the appropriate applications of distance-learning technologies in the learning process.

The following suggestions provide general guidelines for planning and staff development.

1. Involve all stakeholders. All members of the learning community should be informed and involved in determining the priorities for distance-learning implementation. Reach consensus on essential conditions, teaching and learning, and information technologies. Hold informal dialogues to discuss issues, find creative solutions, and gain common understandings. The consensus developed lays the foundation and framework for future decisions. Each educational institution will need to ensure that the framework reflects the unique standards, values, and cultural orientations that are important to its own learning community.

2. Plan systematic staff development programs based on the developed framework and the phases of technology infusion. The staff development program should encompass features that focus on a collegial network supported by integrated distance-learning technologies.

3. Celebrate and share successes at conferences, workshops, meetings, online postings, and video appearances.

Effective implementation of distance learning requires a systemic approach to planning and includes ongoing staff development.

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